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The Value of Value Added Finfish: A Market Solution to Food Inequity

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The Value of Value-Added Finfish: A Market Solution to Food Inequity

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One Mighty Mill

Executive Summary

The onset of the Covid-19 pandemic in the United States led to significant growth in food insecurity throughout the country and revenue loss for its commercial fisheries. Seafood accessibility programs were built in order to offer a solution to this problem by donating seafood to food insecure communities while providing direct financial relief to commercial fishermen by purchasing their landings. The Maine Coast Fishermen's Association (MCFA) started a seafood accessibility program in Maine called Fishermen Feeding Mainers in order to support the state's commercial fishermen and food insecure communities during the pandemic. The program successfully buoyed up commercial fishermen while making local seafood available to soup kitchens, food pantries, etc., so MCFA is working to continue it. However, the majority of its funding comes from grants and donations, which can be unreliable. In order to ensure Fishermen Feeding Mainers can be sustained, MCFA is considering value-added seafood products as a potential source of revenue.

The goal of this project is to understand the market opportunities MCFA can access in order to create a profitable value-added fish product that can help fund Fishermen Feeding Mainers. Research on these opportunities was informed by the Porter's 5 Forces business framework, which analyzes competition within an industry to understand the profit potential of new entrants (Bruin 2016). Two kinds of recommendations came from this research: Market and Product, which offers suggestions on ways MCFA can market a value-added product to stand out amongst its competition, and Supply Chain, which offers suggestions on which partnerships MCFA should capitalize on in order to create a value-added finfish product for retail.

Market and Product Recommendations:

MCFA should prioritize creating ready to eat products, ready to cook products, soups, and stocks due to their low competition and high accessibility in terms of accessible production. The marketing for these products should push nutritional facts (particularly protein, omega-3, mercury free, allergen free, and vitamins), the philanthropic connection of the product to Fishermen Feeding Mainers, the real/natural ingredients used to make the product, and the fact the product is local/Maine based.

Supply Chain Recommendations

MCFA should use haddock, hake, and/or pollock as the fish as the seafood foundation for their value-added retail product. To produce this product, they should utilize existing partnerships as there are plenty of opportunities within the processing, packaging, storage, distribution, and value-added production connections MCFA currently can access. Finally, MCFA should look to invest in the future through the funding of large-scale freezing and new value-added product processing equipment.

Introduction

Food insecurity, defined as “the lack [of] regular access to enough safe and nutritious food for normal growth and development and an active and healthy life,” (FAO et al. 2022) is a leading public health challenge for the United States (Gundersen 2013). Individuals facing food insecurity are at a higher risk for serious negative effects on mental and physical health that can lead to increased rate of diabetes, heart disease, and hospitalization (Gundersen 2013). The onset of the Covid-19 pandemic in 2020 led to a growth of food insecure households in the US from 35.2 million individuals in 2019 (Coleman-Jensen et al. 2021) to approximately 54 million individuals in 2020 (Almohamad, Mofleh, and Sharma 2020), a nearly 160% increase in food insecurity (Almohamad, Mofleh, and Sharma 2020). For families with children, the rate of food insecurity tripled (Almohamad, Mofleh, and Sharma 2020). Creative solutions have been attempted to solve the food insecurity crisis, such as connecting communities in need to their local food systems to allow for the donation of excess food supplies (Almohamad, Mofleh, and Sharma 2020), but these solutions have been found to be difficult to sustain and scale (Almohamad, Mofleh, and Sharma 2020).

The Covid-19 pandemic also triggered detrimental and unpredictable impacts on the entire US supply chain, including the expansive shutdowns of businesses, restaurants, and markets (White et al. 2021). Commercial fisheries especially felt the effects of these changes, as that sector is particularly susceptible to disruptions due to the seasonal and occasionally erratic nature of the industry (White et al. 2021). The loss of the restaurant market in particular led to a significant loss in revenue for US commercial fisheries since restaurant orders make up around 65% of seafood expenditures (Froehlich et al. 2021). The federal government provided \$300 million of seafood industry specific funds to make up for this loss of revenue, but this aid made up less than 1% of total landings buybacks (Froehlich et al. 2021). The Covid-19 pandemic affected the livelihoods of millions of commercial fishermen worldwide, leaving them to grapple with low prices and disruptions to the markets that they rely on to purchase their landings, consequently leaving many of them tied to the dock (Smith et al. 2020).

The Maine Coast Fishermen’s Association (MCFA), an industry-based nonprofit that identifies and fosters ways to restore the Gulf of Maine’s fisheries and sustain Maine’s fishing communities, started a seafood accessibility program called Fishermen Feeding Mainers (FFM) in 2020 in response to these Covid-19 caused problems. FFM uses funds from grants and donations to purchase fish landed in Maine, and then donates that fish to Maine’s food insecure communities through food pantries, soup kitchens, public schools, etc. By purchasing local Maine fish and donating it to local food insecure communities, FFM provides direct financial relief to Maine’s commercial groundfishermen while also providing Maine’s food insecure communities access to healthy local seafood. The main source of FFM’s funding is currently Covid-19 relief funds (followed by grants/donations

and then merchandise sales), and that funding source is a growing area of concern for MCFA. The Covid-19 relief funding is running out, so MCFA is looking for alternative ways to diversify how they fund FFM in order to ensure they can continue to buoy up Maine's groundfishermen and make locally caught seafood accessible to the communities that need it most.

The goal of this project is to analyze the market opportunities MCFA can capitalize on to fund FFM through the revenue from a value-added retail product through a business model similar to the one utilized by Buy One Give One (BOGO) companies like Tom's Shoes and Warby Parker. A BOGO company offers a philanthropic message as marketing for its product, so in the case of Tom's Shoes their BOGO aspect is for every pair of shoes sold, a pair gets donated (Marquis and Park 2014). This business model was first popularized by the success of Tom's Shoes (Marquis and Park 2014), and became a widely embraced model for creating commercially viable businesses built on socially conscious values (Marquis and Park 2014). Current trends in consumer behavior, particularly in the growing millennial generation, show a higher consumer valuation of how a company supports social issues (Marquis and Park 2014), and that consumers are more likely to pay a premium for items that come from socially responsible businesses (Ross and McGiverin-Bohan 2012). Consequently, a BOGO model for an MCFA value-added finfish product could capitalize on this higher consumer valuation of social responsibility by marketing the good that FFM does for Maine's food insecure communities.

The Value of Value-Added

There are multiple reasons why value-added finfish products is the route MCFA should take to diversify how they fund FFM. Value-added products increase the worth of what a fishermen catches by valorizing the whole fish, including byproducts, rather than just the fillet (Cooney et al. 2023), which helps the fishermen get paid more for their catch. This increase in profitability further applies to companies throughout the supply chain, as the value-added process diversifies what seafood products can be offered and consequently attract increased consumer demand (Kim et al. 2017). Value-added also enhances the sustainability of the product and the related seafood supply chain. Depending on the species, between 30% - 85% of the whole catch weight is not utilized for direct human consumption and can be tossed (Al Khawli et al. 2019). Valorization of the whole fish, or at the very least more than just the fillet, can reduce environmental impact by minimizing the actual waste of the seafood through the supply chain (Cooney et al. 2023).

The value of value-added products does not stop at added value to commercial fishermen and environmental sustainability for the supply chain, but also translates to increased profitability in the market. Throughout the US, seafood consumption is growing, including in retail seafood sales where consumers are increasingly favoring frozen over fresh product categories (Love et al. 2022). This is partially due to the onset of the Covid-19 pandemic,

which lead to a dramatic increase in consumer interest of retail seafood (Sun et al. 2022) and shift to a greater relative consumption of seafood at home rather than through takeout or restaurants (Sun et al. 2022), but pre-Covid sale numbers also show consumers favoring retail seafood, since out of all seafood purchased for consumption, most of it (by weight) is purchased for consumption at home (Sun et al. 2022). Considering retail is the main outlet that US consumers use to access seafood (Love et al. 2022), a value-added retail product can take advantage of this growing desire for seafood at home. Retail markets are also noticing the growing desire of seafood consumers to cook at home, and in response they are expanding their seafood offerings in their retail freezer cases (Surathkal et al. 2017). Consumers and retailers are recognizing that frozen products offer more flexibility since they do not spoil nearly as fast as fresh seafood (Love et al. 2022) which may be attractive to consumers since they can consume the product at their own convenience. Overall, value-added offers MCFA an opportunity to take advantage of a product that is better for the Gulf of Maine fishermen they serve, better for the environment they work to protect, and is likely more desirable by consumers in the retail space.

Project Methodology

This value-added finfish market opportunity study is organized using the Porter's 5 Forces framework, which analyzes competition to determine the profit potential of an industry (Bruin 2016). The benefit of this framework is that it analyzes not just competition from current competitors within the industry, but also how that competition is influenced by the supply chain, potential of new entrants into the space, and the threat of current substitute products in the market (Bruin 2016). The specific forces it analyzes are rivalry among existing competitors, threat of new entrants, bargaining power of suppliers, bargaining power of buyers, and the threat of substitute products (Bruin 2016). While all these forces are interconnected, this project focuses on three of the forces: rivalry among existing competitors, bargaining power of suppliers, and the threat of substitute products. Considering the limited time available for this work, these three forces offer the most cohesive foundation for understanding what value-added product(s) would offer the highest potential for success, and the supply chain necessary to get those product(s) from commercial fishermen to the retail market. The forces that are the focal point of this study are defined as follows:

Rivalry among existing competitors: the intensity of competition in the current marketplace based on the number of existing competitors of similar size and power (Bruin 2016). If an industry has a lot of companies of the same size with similar effects on the marketplace (e.g. the same customer loyalty or ability to advertise), then that industry has a high rivalry among existing competitors, while an industry with a few large companies that make up most of the market has a low rivalry (Bruin 2016). For this study, the value-added seafood product competitors are looked at through the lens of how they market their products, particularly with an eye towards sustainability, philanthropy/story, and nutrition. Data was

collected on the products offered by companies that attended the Seafood Expo North America as they are at the forefront of value-added retail seafood, Natural Products Expo West (for the same reason as the seafood expo), and/or are companies that have products for sale in Hannaford or Whole Foods markets (the markets researched for this study).

This market focus on sustainability, philanthropy/story, and nutrition offers a comprehensive understanding of how to competitively advertise a product in a retail market because of their effects on purchasing decisions. Consumers often perceive foods marketed as local to be of higher quality, fresher, more nutritious, and better tasting, all of which makes them willing to pay a higher price for that food product (Campbell, DiPietro, and Remar 2014). In regards to seafood, products seen as environmentally sustainable, with eco-labels, of US origin, and/or wild-caught positively impacts a consumer's willingness to pay for that product (Hilger et al. 2019). Not only that, but products also marketed as socially responsibly positively impacts a consumer's purchase decision if that consumer believes the marketing (Oppewal, Alexander, and Sullivan 2006). This can further lead to increased customer loyalty for a brand/business which means they are more likely to repurchase certain products (Marquis and Park 2014). Nutrition can also positively influence how a consumer perceives the quality of a product, and consequently affect their purchase decision (Zou and Liu 2019).

Threat of substitute products: the existence of competitive products inside and outside of common product boundaries (Bruin 2016). For example, the common product boundary of a fish burger would be other brands of fish burgers. These products are considered commonly competitive if a consumer is looking to purchase fish burgers and is trying to choose between brands. They are all generally supplying the same kind of product, and are also usually found next to each other or at least close by in the retail case. Substitute products on the other hand would be a product like a beef burger. Both the fish burger and beef burger fulfill a similar need, e.g., both are burgers, and are substitutable even though they do not necessarily exist in the same competitive space since one competes within the seafood industry and the other within the beef industry. In this case, a consumer is looking to purchase a burger but not specifically one that is fish based or beef based so they could be willing to use either.

Data for this product research was collected from the online store databases of Hannaford and the Portland, Maine Whole Foods supermarkets. Hannaford was chosen because MCFA already has offered its retail monkfish stew to certain Hannaford stores, and the supermarket chain is a regional Maine based grocery retailer with a commitment to supporting local products and sustainable seafood (Hannaford 2023), and so demonstrates some value alignment with MCFA. The Portland, ME Whole Foods was chosen because it is the only Whole Foods store in the entire state, commits to sourcing sustainable seafood (Whole Foods Market 2023), and MCFA's processing partner True Fin currently sells retail seafood products in Whole Foods supermarkets throughout New England and Mid-Atlantic states.

The products at both stores are broken down into the following categories:

Table 1: Substitute Product Categories and Descriptions

Product Category	Product Description
Breaded	Any seafood products, usually fillet, that are coated in breading and are usually sold raw and frozen. Generally not considered something to be dipped unlike a nugget or fish stick.
Burger	A patty made up of ground seafood and/or kelp or similar ingredient
Cake	A patty made up of ground or chopped up seafood and/or kelp or similar ingredient, but not sold as a burger (usually specified as a fishcake or crabcake)
Dip	A seafood product that complements other foods that are meant to be dipped into it
Nugget	A generally breaded seafood product meant to be dipped, e.g., a chicken nugget but made from fish
Preserved	A shelf stable seafood product, e.g., canned tuna
Ready to Cook	A typically frozen seafood product that is marinated or comes with additional flavorings, but is always meant to be cooked before consumed
Ready to Eat	A typically frozen seafood product that comes as a whole entrée that is meant to be thawed and/or warmed up before eaten, but is already cooked at the time of purchase
Smoked	A seafood product that is smoked, and ready to be eaten out of the packaging, e.g., smoked salmon
Soup	A seafood-based soup, stew, chowder, etc. This can also be considered ready to eat, but the product type is separated because the primary value-added processor MCFA partners with makes soup. Any product made with this partner would compete with other soups/stews/chowders.
Stick	A generally breaded seafood product meant to be dipped, but is not considered a nugget due to its size, e.g., a fish stick.

Bargaining power of suppliers: the amount of power and control a supplier has on the prices and quality of its supplied goods (Bruin 2016). Industries where there are few suppliers have a higher bargaining power of suppliers since the suppliers have more power to set prices, while industries where there are more suppliers have a lower bargaining power and tend to put businesses in a better position. To understand the bargaining power of suppliers within the supply chain MCFA can access, data was collected from the Portland Fish Exchange and the processors/value-added production companies MCFA currently partners with.

The Portland Fish Exchange (PFE) is a non-profit fresh seafood auction based in Portland, Maine, and offers offloading and auctioning services to commercial fishermen throughout

the Gulf of Maine. The PFE auction is the primary source of groundfish for FFM, and consequently the auction trends at the PFE are vital to understanding which species MCFA should focus on for a value-added retail product. Now, the PFE does not offer landings data through their website, but they do offer data on seafood sales, which details how much weight (in pounds) of each species that was purchased at an auction. Since there is an auction nearly every day, sales data will give an approximate trend as to the weight of fish landed, and can then inform what to expect in the future. Sales data were collected from 2019-2022 on, per suggestions from MCFA, the following groundfish: Atlantic pollock (*Pollachius virens*), monkfish (*Lophius americanus*), white hake (*Urophycis tenuis*), haddock (*Melanogrammus aeglefinus*), greysole (*Glyptocephalus cynoglossus*), and dabs, also known as American plaice, (*Hippoglossoides platessoides*).

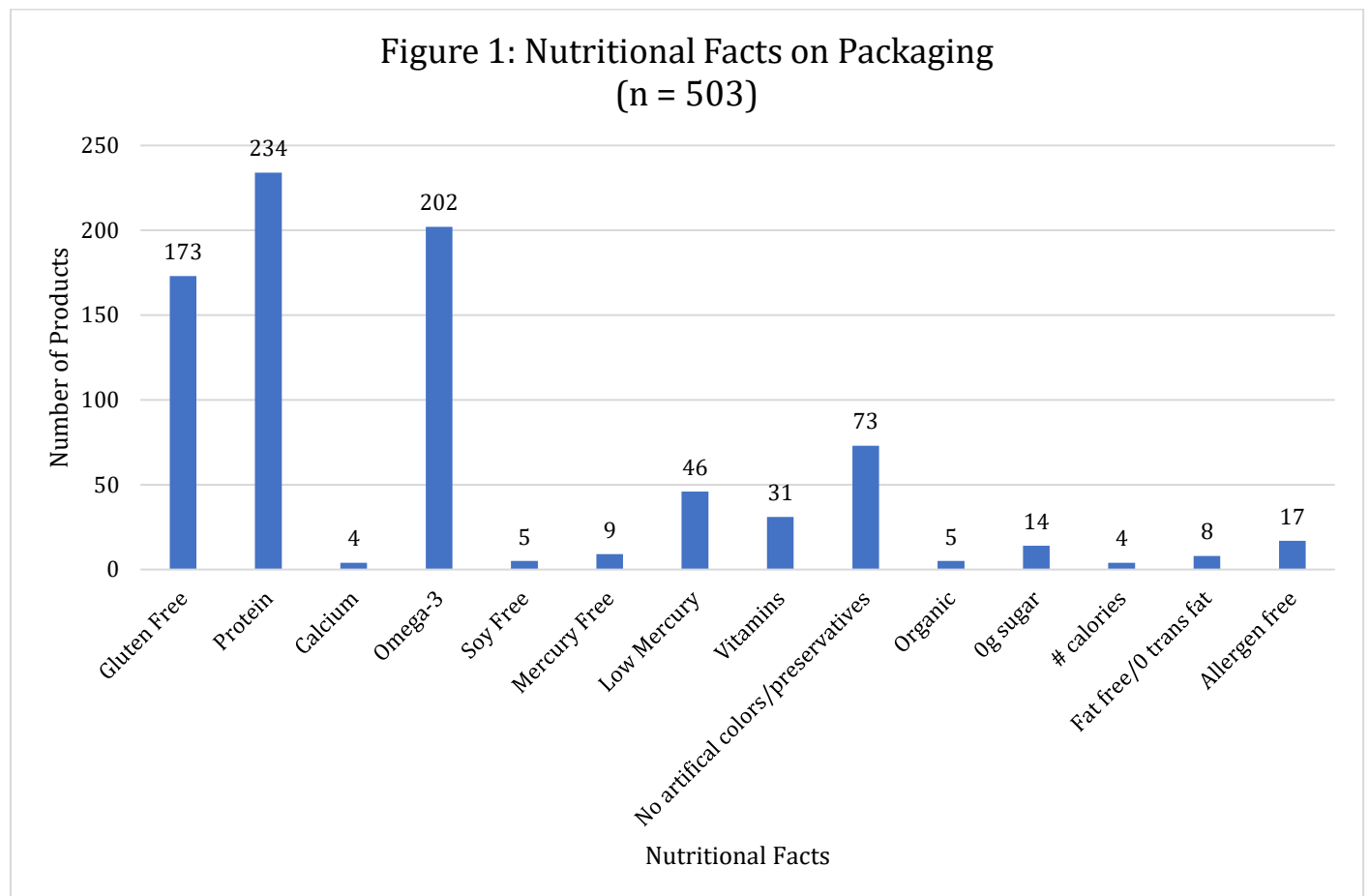
On the processing front, MCFA currently works with three Portland, ME based seafood processors: NOVA Seafood, LTD (NOVA), Free Range Fish & Lobster (Free Range), and True Fin. They also work with one value-added production company, Hurricane's Premium Soup and Chowder (Hurricane) based in Greene, Maine. The seafood processors cut and freeze the fish MCFA donates to underserved Maine communities, and process the fish MCFA sends to Hurricane to turn into the Maine Coast Monkfish Stew, a frozen seafood stew created in partnership between Hurricane and MCFA that is offered in various small retailers and Hannaford supermarkets throughout Maine and coastal New Hampshire. This supply chain analysis was informed through interviews held with George Branco the VP/GM of NOVA, Joe Ray the President of Free Range, Jen Levin the CEO and President of True Fin, and Phil Wilbur the Founder & President (Addendum 1 for the interview questions).

The goal of the interview questions was to understand the potential opportunities each company could bring to the supply chain needed for an MCFA value-added seafood product. All answers were organized into three categories: processing ability, processing interest, and storage ability. Processing ability includes any answers related to the current ability of these companies to process fish and/or value-added products. Processing interest covers answers related to the potential opportunities a company is interested or not interested in pursuing. Finally, storage/distribution ability includes answers related to the current ability of these companies to store fish for MCFA and distribute final products to retail stores. Answers were then organized into barriers and opportunities within each category. Barriers pertain to answers that would impede MCFA's ability to create a value-added retail finfish product, while opportunities are answers that MCFA can capitalize on to create that product.

Rivalry Among Existing Competitors: Company Competition

Data from 503 different value-added seafood products from 42 different companies were collected to gain a broad image of the current retail seafood marketplace. These value-

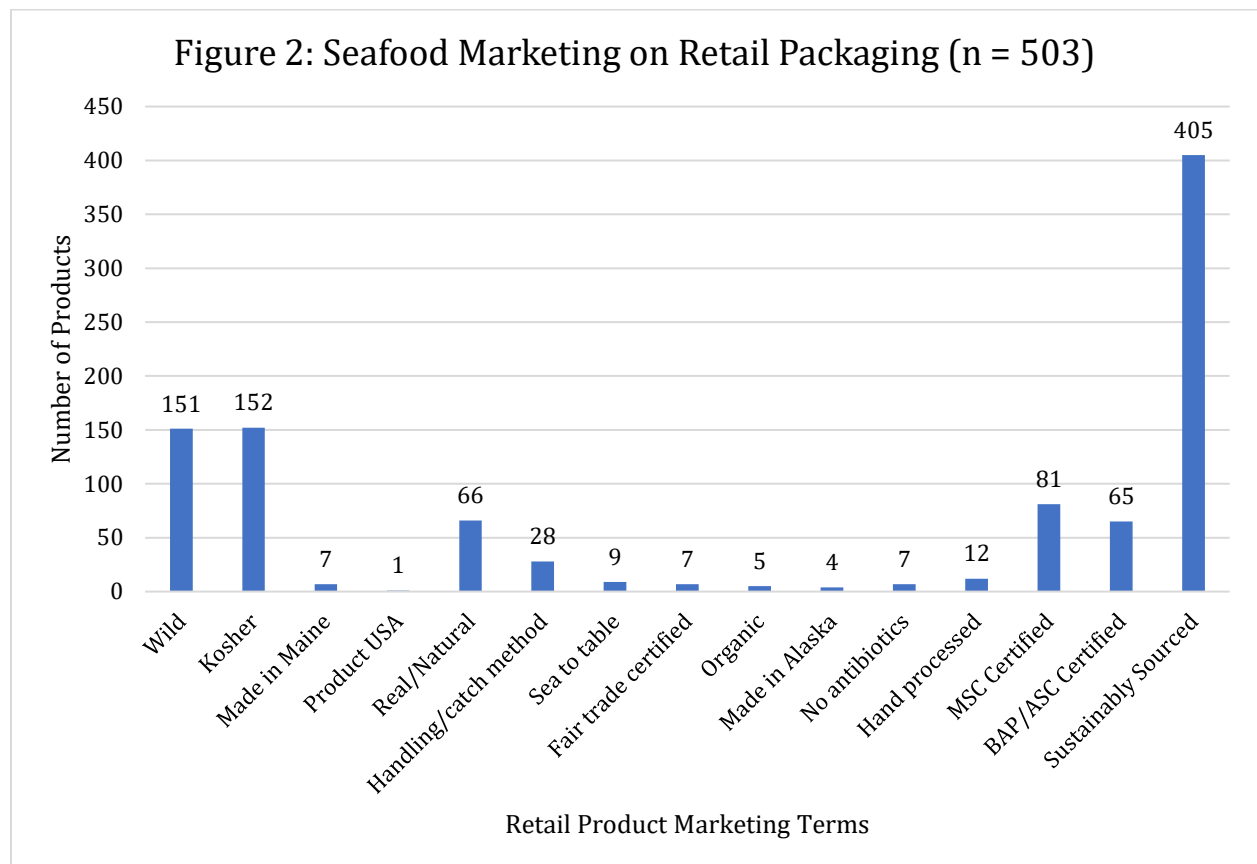
added seafood products were chosen based on the fact they are all offered by companies that attended either The Seafood Expo North America or Natural Products Expo West and are consequently at the forefront of value-added retail production, and/or are offered for sale in Hannaford/Whole Foods supermarkets. For each company, three categories of information were collected: base identifiers (e.g., company name, product name, species, price, etc.), nutritional marketing (this includes any mentions of protein, calcium, gluten free, soy free, etc.), and story marketing (e.g., philanthropic component, Marine Stewardship Council certified, sustainable sourcing mentioned, etc.). For the purposes of this market study, only data related to how companies market the nutritional and story aspects of their products were analyzed because of the positive influence both nutrition and story have on a consumer’s purchasing decisions ((Seafood Nutrition Partnership 2022) (Marquis and Park 2014)).



Out of the 503 different products reviewed, only 363 products had nutritional and/or story-based marketing on the packaging. The other 140 products did not use any descriptive nutritional and/or story-based marketing tools. Nearly 50% of the total products include a mention on the packaging of the product’s content of protein (234 products) and/or omega-3s (202 products), specified either by serving size or just to show

that the product includes those nutritional elements, and 173 different products are marketed as gluten free (Figure 1). On the other end, the least number of products mentioned the specific number of calories per serving or that the product includes calcium, with 4 products for each category (Figure 1).

When it comes to more story-based/general seafood marketing found on the retail product packaging, the three most common used descriptors are “sustainably sourced” with 405 products, “wild” with 151 products, and “Kosher” with 152 products (Figure 2). Meanwhile, product marketing terms with place-based descriptions such as “Made in Maine” or “Made in Alaska” are found on 2% of the 503 products reviewed (Figure 2). Only 29% of the reviewed products are either MSC or BAP/ASC certified (Figure 2), which is much less than the 81% of products that mention some sort of sustainable sourcing (Figure 2).



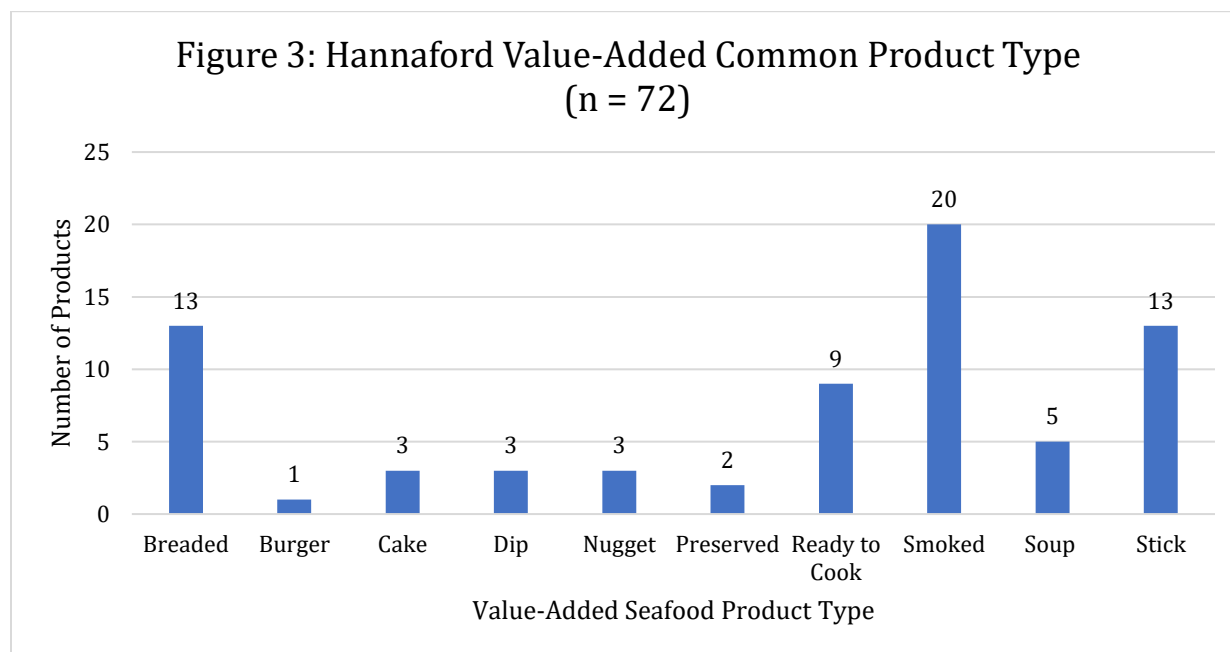
Overall, the sourcing method, whether that is focused on a general description of sustainability, or specified to certain capture methods, are the most common market descriptors for value-added seafood products.

Threat of Substitute Products: Product Competition

Common Product Boundaries

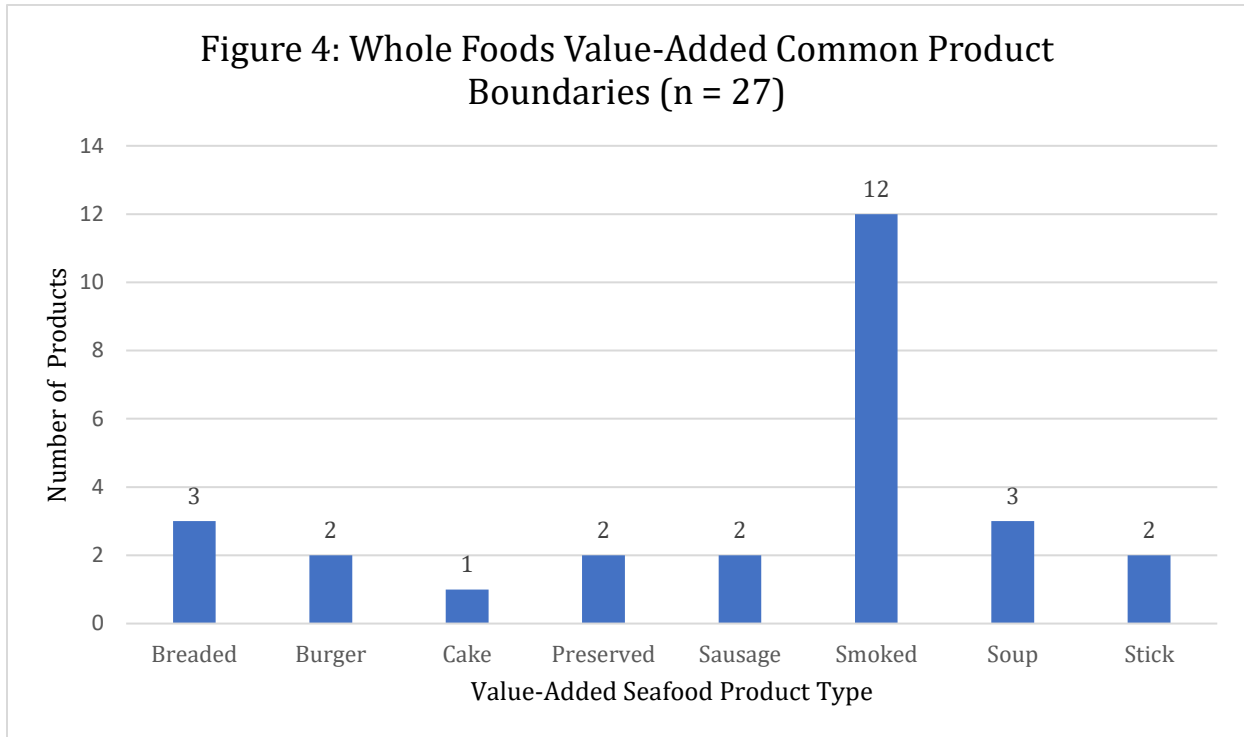
To understand the competition MCFA's value-added finfish product would face with other substitutable products, data was collected on the online retail inventory of Hannaford and Portland, ME Whole Food supermarkets. While these supermarkets likely offer products in their stores that are not on their online inventory, any value-added seafood product created by MCFA should prioritize being offered online as well as in stores as consumers are trending towards purchasing a majority of their groceries online (Astashkina, Belavina, and Marinesi 2019). Fresh and frozen fillet were not included in this data because a goal of MCFA with their value-added product is to pay commercial fishermen a competitive wage for their catch, so valorizing the whole fish rather than just the fillet would be necessary in order to sustainably support paying commercial fishermen in a way that keeps the price of the final product also competitive. Canned seafood was also not included in this data, because the supply chain that MCFA has available to them would not be able to produce a canned product, and consequently MCFA would not compete in the canned seafood space.

There are 10 different value-added frozen seafood product types that fit within the common product boundaries found in Hannaford supermarkets (Figure 3). The three types with the most products are smoked, stick, and breaded products, with 20 different smoked seafood products, and 13 different breaded and stick products (Figure 3). Burgers and preserved seafood are the least competitive, with 1 and 2 products respectively (Figure 3).



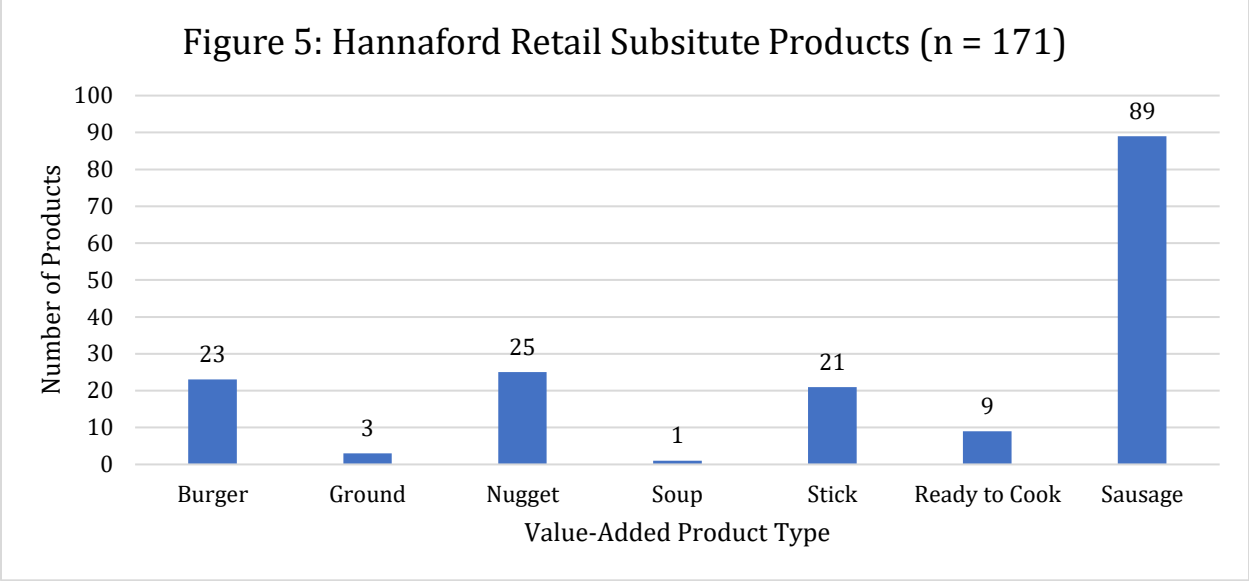
The Portland, ME Whole Foods offers 8 different common product boundaries: breaded, burger, cake, preserved, sausage, smoked, soup, and stick (Figure 4). Smoked products, such as smoked salmon, make up nearly 50% of the total value-added products available for online purchase (Figure 4). Like the common product boundary make up at Hannaford,

burgers and preserved seafood (which in this study does not include canned seafood) are some of the least competitive products found in the Portland, ME Whole Foods online inventory (Figure 4).



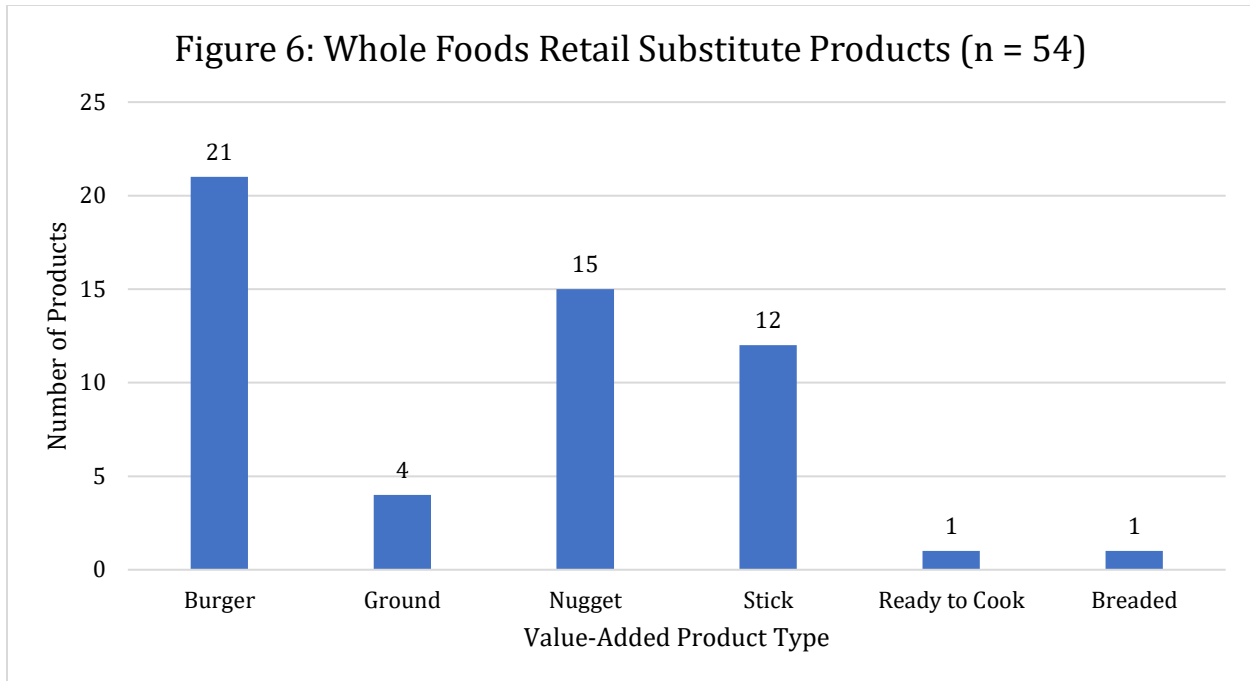
Substitute Products

Like the common product boundaries, the data for substitute products were collected from Hannaford and the Portland, ME Whole Foods online retail inventory. The substitute products found in Hannaford are separated into 7 categories: burger, ground, nugget, soup, stick (which includes products like chicken fingers, e.g., products that are not ground unlike nuggets), ready to cook, and sausage (which also includes hotdogs). Figure 5 shows the number of non-seafood substitute value-added products sold online at Hannaford.



Sausages make up 52% of Hannaford’s substitute products, with 89 different products (Figure 5). Ready to cook products, ground products, and soup collectively make up less than 8% of Hannaford’s substitute products (Figure 5). There are no competitive smoked products, the most competitive product in Hannaford’s common product boundaries (Figure 3).

Whole Foods’ online retail inventory offers 6 categories of substitute products: burger, ground product, nugget, stick, ready to cook, and breaded. Here, burgers make up nearly 50% of the substitute products, with 21 different products offered (Figure 6). Nuggets (like breaded chicken nuggets) and stick products (like chicken strips) make up the next two largest categories of substitute products with 15 and 12 products respectively (Figure 6). Like Hannaford, ready to cook products and ground products are two of the smallest categories (excluding breaded) with 1 and 4 products respectively (Figure 6).



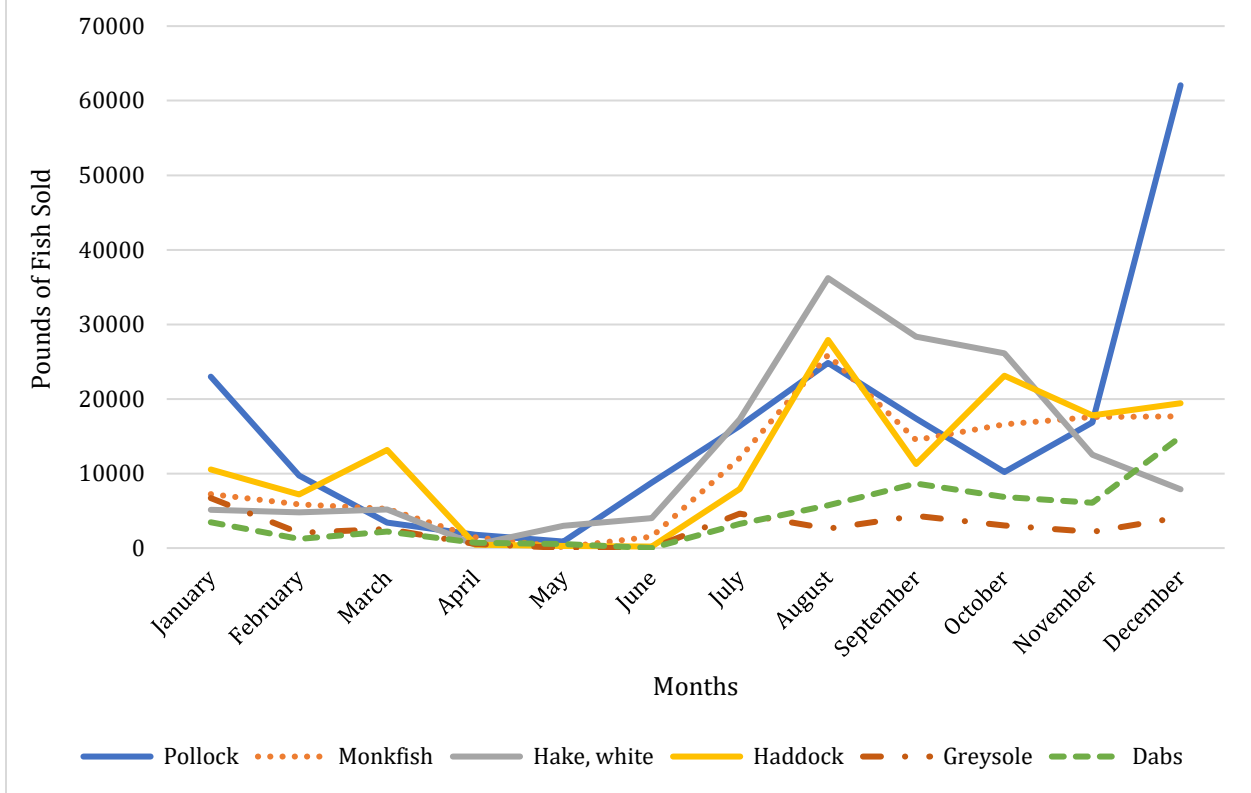
Bargaining Power of Suppliers: Supply Chain Analysis

Portland Fish Exchange

Weekly sales data was collected for each of the six species from 2019 – 2022. Since 2020 – 2022 were during the height of the Covid-19 pandemic, 2019 was included to ensure that the groundfish trends used pre-pandemic data.

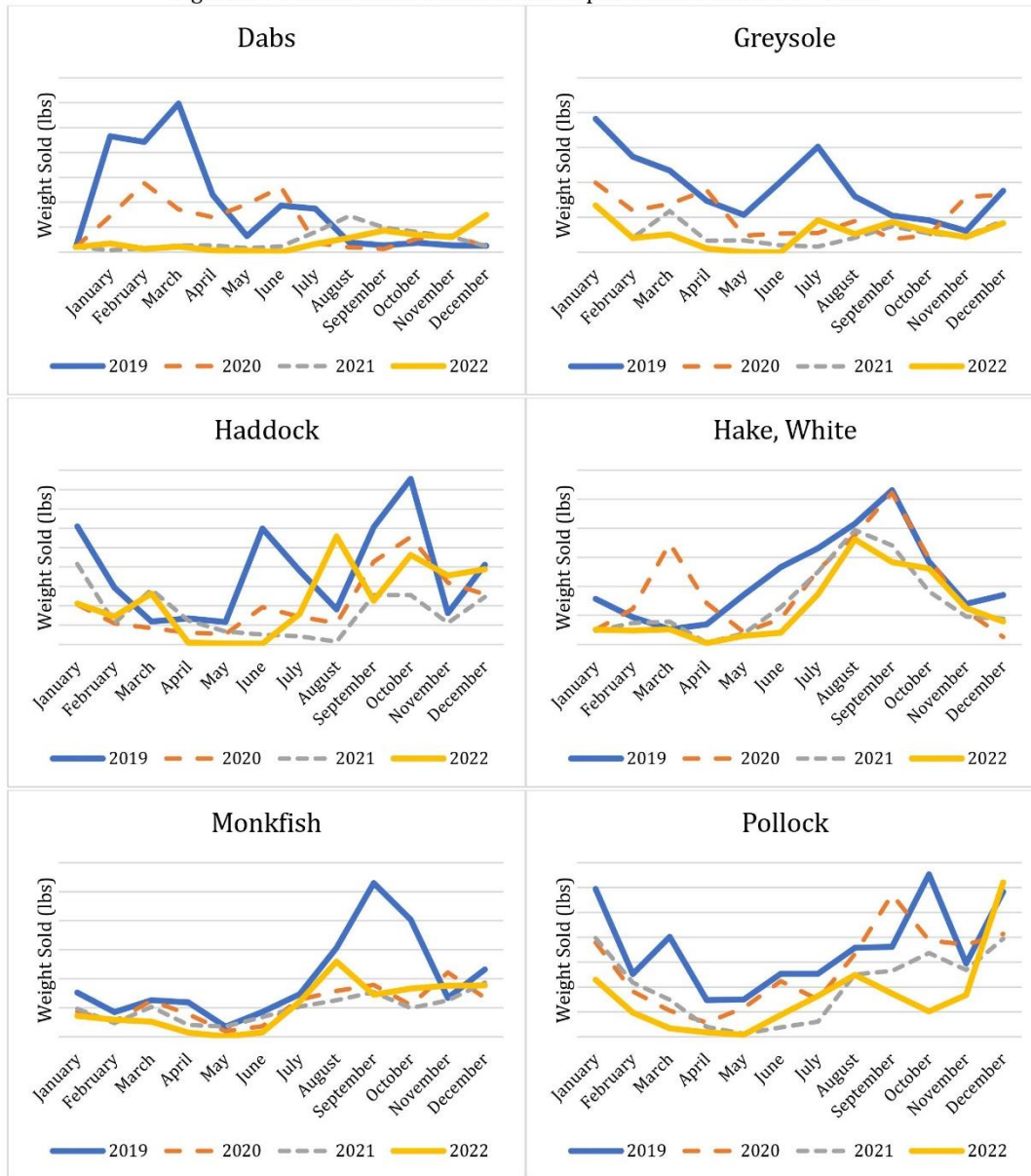
In 2022, Atlantic pollock (*Pollachius virens*), white hake (*Urophycis tenuis*), haddock (*Melanogrammus aeglefinus*), and monkfish (*Lophius americanus*) had the highest peaks of total pounds of whole fish weight sold (Figure 7). Atlantic pollock peaked at over 60,000lbs sold, almost twice as much as white hake which peaked at 36,307lbs sold (Figure 7). All six species reached their lowest sold weights between the end of March and the beginning of July (Figure 7). All 2022 peak weights for the six species occur sometime between July and February, with the highest peaks occurring in August, October, and December (Figure 7). The 2022 sold weight for greysole and dabs is the lowest of the six species (Figure 7), with weights ranging from 0lbs – 6,705lbs for greysole and 0lbs – 14,920lbs for dabs.

Figure 7: 2022 PFE Sales Data



There is a steep drop in sold weight from 2019 to 2020 for all six species, and that drop in weight continues for all six species in 2021 (Figure 8). While the 2022 sold weight does not fully return to 2019 levels for all six species, the sold weights for pollock, haddock, hake, monkfish, and dabs do return to 2019 levels in some months (Figure 8). At certain points in 2022, sold weight for haddock, pollock, dabs, and monkfish were higher than they were in 2019 (Figure 8). Hake and monkfish also peak in late Summer through early Fall in 2022, which is the same general peak time for both species in 2019 (Figure 8). Pollock follows similar 2019 peak sold weights months in 2022 during late Summer and mid-Winter, though there is no October to November peak in 2022 as there is in 2019 (Figure 8). Haddock sold weight in 2022 follows similar peaks as in 2019 during the months of October and December, though the other sold weight peaks have shifted (Figure 8). Instead of peaking in June as it did in 2019, the 2022 haddock peaks are in August, March, and November (Figure 8).

Figure 8: PFE Sold Groundfish in Pounds per Month from 2019 – 2022



Supply Chain

The responses to the interviews held with three seafood processors, NOVA Seafood, LTD (NOVA), Free Range Fish & Lobster (Free Range), and True Fin, and one value-added production company, Hurricane’s Premium Soup and Chowder (Hurricane) defined three different sections of barriers and opportunities for an MCFA value-added seafood product: processing ability, processing interest, and storage/distribution ability.

Processing ability:

The four companies that MCFA works with all have various levels of processing capabilities. NOVA, Free Range, and True Fin all can process whole fish to fillet, either by hand-cutting (NOVA, Free Range, and True Fin) or machine-cutting (True Fin). For value-added production, only Hurricane and True Fin have the access to value-added equipment, either to soups, stews, and chowders with Hurricane or through True Fin's co-packers. All four companies have various abilities to freeze, store, and distribute either filleted fish or final value-added retail product. The processing ability that MCFA can access through its partnerships face two main barriers. The first is that across-the-board concessions are made to cut fish for MCFA, leading to very minimal or no profit, or in some cases losses in revenue. These concessions include cutting at low prices to barely cover costs, and/or donating worker time to cut, portion, and/or freeze filleted fish. The second barrier deals with processing capacity. Currently, True Fin is completely at capacity with their in-house processing. NOVA and Free Range can add more processing, but their ability to grow is limited by the fact they only cut by hand, and consequently their processing capacity is based on the number of fish cutters they employ. Finding skilled fish cutters is difficult, and training new fish cutters to cut at a profitable speed can take two to three years. While this may not be a barrier now, it may become a concern in the future if new fish cutters remain difficult to employ.

On the other hand, MCFA's current partnerships do offer multiple opportunities within their current abilities to process fish. None of the seafood processors consider the supply of groundfish a bottleneck since there are many willing commercial fishermen and available groundfish to buy. According to the seafood processors, the lack of a consistent market is holding back the supply to what it could be. All the processors can also expand their production capabilities. True Fin can expand their production through their co-packing partnerships with larger companies like Bristol Seafood that offer machine cutting and packing. Free Range and NOVA, while they rely solely on hand processing, can fit in more cutting and bulk fillet freezing projects so long as they are cutting easily filleted groundfish like hake, pollock, haddock, or monkfish, and not difficult to cut fish like dabs and greysole. Finally, Hurricane has the capacity to add more soups, chowders, and/or stews without much difficulty.

Storage/distribution ability:

All four companies have varying abilities to store and distribute filleted fish and/or final retail product. The only barriers that came up during the interviews were related to Free Range's distribution ability and Hurricane's storage capacity. Free Range offers truck distribution, but its distribution area is limited to the broader Portland area. Hurricane can only store final product, meaning that it cannot be a storage facility for fish to be used in a value-added product. It should also be noted that while storage at NOVA and Free Range is currently not a concern, MCFA has been able to quickly move frozen bulk fillets from their

freezers. Consequently, any limitations of NOVA's and Free Range's freezer space is not fully known as it has yet to be a problem.

When it comes to available opportunities, all four companies offer advantages that MCFA can capitalize on. All three seafood processors can pick up fish from the Portland Fish Exchange, either directly or via a co-packer. Out of all the seafood processors, True Fin likely has the most storage available for whole fish, processed fish, and final value-added retail product due to the company's connections to Portland based Americold, and other various cold storage facilities near the distribution centers that are accessible through True Fin's partnerships with Bristol seafood and Whole Foods. Similarly, True Fin can distribute to Whole Foods throughout New England and mid-Atlantic states. Hurricane can take care of all distribution logistics assuming the MCFA value-added retail product is being delivered to one of the company's existing customers.

Processing interest:

While most of the interview responses provided information on the current abilities of MCFA's various partnerships, they also provided both barriers and opportunities to future endeavors that MCFA can be a part of. A large barrier to expanding value-added production with NOVA, Free Range, and True Fin is that none of them have their own value-added machines, nor are they interested in building their own infrastructure to create value-added products. They either do not have the capital to take on what would need to be an incredibly expensive investment, and/or are content with the profitability of their current capabilities and see no need to move beyond that. Currently as well, Hurricane's facility can only produce soups, stews, and chowders as they are unequipped to produce stocks, and are not interested in other value-added products that do not use the equipment they already have available.

However, all processors are interested in and excited about the prospect of continuing to work with and support MCFA's efforts. Though they are not interested in building out their own production capabilities, True Fin is processing curious, and interested in building relationships with individual co-packers to build partnerships and harness opportunities. They are supportive of the idea of working with MCFA and putting the non-profits name on a co-connected retail product. For Free Range and NOVA, while they are currently making concessions for MCFA, they could make processing for the non-profit sustainable because hand-cutting at a higher volume could make MCFA processing projects profitable, and cutting for MCFA keeps their skilled fish cutters busy which in turn ensures they can pay and consequently keep their cutters. Finally, if they can expand their facilities, Hurricane is interested in pursuing stocks as an additional value-added product, and they are interested in continuing to work with MCFA not just because the organizations share similar values, but also because Hurricane has had distributors start to reach out about the Maine Coast

Monkfish Stew, a MCFA created value-added product MCFA that is sold in retail to build awareness and profits towards FFM.

Discussion

Overall, there is opportunity available that MCFA can capitalize on in order to build their own value-added product. The market for value-added fish products is growing, especially considering retail is the main outlet for US consumers to access seafood (Love et al. 2022). Building their own value-added finfish product, or at the very least partnering with a company to co-brand a value-added finfish product, would allow MCFA to take advantage of this market growth. The following recommendations inform the strategies MCFA should take in order to build a competitive value-added finfish product.

Recommendations

The business recommendations are separated into two parts: Market and Product, and Supply Chain. The Market and Product section offers recommendations on the products MCFA should prioritize making, the associated nutritional facts that should be marketed for each value-added product type, and how overall the product should be marketed. The Supply Chain section offers recommendations related to current and future opportunities MCFA should capitalize on within the supply chain, including fish to use and partnerships to prioritize.

Market and Product

Of the Hannaford/Whole Foods supermarkets' value-added seafood products, MCFA should prioritize creating ready to eat products, ready to cook products, soups, and stocks. These products face low competition amongst the common product boundaries and substitute products at Hannaford and Whole Foods. They are also the most likely the most accessible products (in terms of production) based on the value-added production equipment MCFA currently can access. When it comes to retail seafood, the convenience of a product can have a positive effect on a consumer's purchasing decisions (Seafood Nutrition Partnership 2022). A frozen or shelf stable value-added finfish product provides that convenience by ensuring the product can be used at the consumer's discretion (unlike fresh product) and make seafood more accessible since consuming the recommended value-added products (e.g., ready to eat, ready to cook, etc.) does not require seafood cooking knowledge. These sorts of seafood entrees can be looked at by consumers as a product that will save them both time and energy in the preparation (Surathkal et al. 2017).

For all products (outside of smoked and preserved due to their high level of competition), the nutritional facts recommended to be used to competitively market those products via the packaging are noted in Table 2. While nutritional facts can have a mixed influence on a

consumer’s purchasing decisions, largely due to the consumer’s prior knowledge of nutrition (Zou and Liu 2019), nutritional facts have been shown to affect how a consumer views the quality of a product (Zou and Liu 2019). This influence is especially true for seafood, which is viewed by most consumers as a component to a healthy diet (Surathkal et al. 2017), and consumers have been shown to pay more attention to the nutritional content of healthy foods (Zou and Liu 2019).

Protein and omega-3 are commonly found marketing tools in all seafood products, so while it is recommended to use these on MCFA’s value-added product packaging, they should not be relied on as the main marketing tool unless they are higher than other competitive products. It should also be noted that certain nutritional factors, such as protein, vitamin content, etc. can and should be boosted by additional ingredients such as vegetables and grains added to soups.

The following table notes the associated nutritional facts that should be used to market whatever value-added seafood product Maine Coast ends up producing. The 11 products noted all mostly share the same nutritional marketing terms, except for the ones that should also be considered mercury free rather than mercury low.

Table 2: Recommended Nutritional Marketing Terms for Value-Added Products

Value-Added Seafood Products	Nutritional Marketing Terms
Ready to eat	protein, omega-3, low mercury or mercury free, allergen free (gluten, dairy, nuts, etc.), vitamins
Ready to cook	protein, omega-3, mercury free, allergen free (gluten, dairy, nuts, etc.), vitamins
Soup	protein, omega-3, low mercury or mercury free, allergen free (gluten, dairy, nuts, etc.), vitamins
Stock	protein, omega-3, low mercury or mercury free, allergen free (gluten, dairy, nuts, etc.), vitamins
Stick/nugget	protein, omega-3, low mercury or mercury free, allergen free (gluten, dairy, nuts, etc.), vitamins
Burger	protein, omega-3, mercury free, allergen free (gluten, dairy, nuts, etc.), vitamins
Cake	protein, omega-3, mercury free, allergen free (gluten, dairy, nuts, etc.), vitamins
Breaded	protein, omega-3, mercury free, allergen free (gluten, dairy, nuts, etc.), vitamins
Sausage	protein, omega-3, low mercury or mercury free, allergen free (gluten, dairy, nuts, etc.), vitamins
Dip	protein, omega-3, low mercury or mercury free, allergen free (gluten, dairy, nuts, etc.), vitamins
Ground	protein, omega-3, low mercury or mercury free, allergen free (gluten, dairy, nuts, etc.), vitamins

Outside of these facts, pushing story (including local/Maine), the real/natural ingredients, lack of artificial colors/preservatives, and/or calorie count per serving are recommended to add to the packaging. In particular, the story of an MCFA value-added product is vital to making the product competitive. The connection to FFM gives the product a philanthropic component, something that certain consumers are willing to pay a premium for (Ross and McGiverin-Bohan 2012). In fact, there are indications that consumers prefer companies that have a socially responsible component (Oppewal, Alexander, and Sullivan 2006). The food donation aspect of this product provides unique advertising opportunities that could make the value-added finfish product particularly competitive. The fact it would be a local product if sold in Hannaford and certain Whole Food supermarkets is also important to making it competitive in the market. The demand for local food has grown significantly across North America (Lang and Lemmerer 2019). Food labeled as local is perceived by consumers to have a higher product quality, better taste, and more environmentally sustainable, all of which positively influences their purchasing decisions (Campbell, DiPietro, and Remar 2014). By combining the stories of philanthropy and local, an MCFA value-added finfish product will stand out in the retail market.

Supply Chain

The supply chain MCFA needs to access in order to create a successful value-added finfish product needs to include, in order, a source of fish, finfish processors, bulk freezing facilities, storage facilities, value-added production facilities, and distribution. MCFA's currently has access to each step of this supply chain, and the following recommendations list what opportunities MCFA should take advantage of within each step.

The Portland Fish Exchange (PFE) will work as an effective source of finfish as it offers vessel offloading and fresh whole fish storage facilities. MCFA should prioritize purchasing from the PFE haddock, hake, and/or pollock as the seafood ingredient for the value-added product. These species are all flaky white fish and consequently have similar flavors and consistencies. It would be possible in fact use all three within the product, with the ingredient labeled as white fish (haddock, hake, and pollock). Since these fish all peak at different times throughout the year, using all three species would ensure that MCFA can access the finfish it needs for the product.

For the finfish processors, bulk freezing facilities, storage facilities, value-added production facilities, and distribution, MCFA should utilize its existing partnerships. NOVA and Free Range can be used to pick up fish from the PFE, hand-cut it to order, and store fresh whole and frozen filleted product. In order to ensure this work is sustainable for these processors and they are making little to no concessions, the price MCFA's pays to process should break even or lead to small profit. This will work for three reasons:

1. The processors are proud to support Maine Coast's and FFM's mission and values. MCFA and FFM support the commercial fishing communities these processors rely on, they feed the underserved members of their local communities, and by providing local finfish to public school, FFM connects younger generations to local seafood, potentially building future consumers.
2. Cutting for FFM provides processors with a reliant source of work which gives their experienced fish cutters work to do during the slow months. This ensures they can continue to pay their workers and consequently keep them employed. Trained fish cutters are hard to come by, and training new ones takes years, so keeping current experienced cutters is paramount to the continued profitability of these companies.
3. Both processors can take advantage of volume cutting to offset low prices and either break even or gain a small profit from cutting for MCFA.

The packaging and freezing of an MCFA value-added finfish product can be outsourced to True Fin's co-packers and/or Hurricane. True-Fin's co-packer partnerships and Hurricane both have access to packaging and freezing equipment, and consequently would not need to invest in new equipment. When it comes to storage, all four of MCFA's partner can store the value-added product at different stages. NOVA, Free Range, and True Fin can store fresh whole fish and fresh or frozen filleted fish. True Fin and Hurricane can store final stage value-added product. In terms of distribution, True Fin and Hurricane offer the most opportunity. True Fin can move the value-added product it makes with its co-packers to Whole Food supermarkets throughout New England and Mid-Atlantic states, and Hurricane can move its value-added soups, stews, and/or chowders to the retailers they already work with. It is also possible to combine these forces, where the products Hurricane makes can then be moved by True Fin, since that company already uses Hurricane to make a chowder that is offered in various small retailers and Whole Foods markets throughout New England and Mid-Atlantic states.

Finally, there is also potential for MCFA to invest in future opportunities that could help its value-added seafood product. MCFA can help build investment in the growth of Maine Coast's current partnerships through the purchasing of two kinds of equipment: a source of large scale freezing and storage particularly of whole fish, and value-added product processing. Large scale freezing equipment that can freeze whole fish would benefit MCFA because it would ensure they can always have fish available for purchase. A consistent source of fish is paramount to building value-added product inventory, and freezing whole fish would provide a solution to the unpredictable nature of wild caught fishing by allowing commercial fishermen to freeze their catch during peak seasons when they would normally flood the market. The PFE would be the best owner/operator of this freezing equipment due to their size, and the fact they work with multiple seafood companies throughout Maine. In order to make the equipment profitable and sustainable, it can be based off a fee system that would allow the community to access it while a primary organization (PFE) ensures its upkeep (which is something smaller processors likely do not have the capacity

or space for). For value-added product processing equipment, Hurricane expressed interest in adding new value-added processing machines (in particular, stock) which would require extensive investment in space and equipment. Considering seafood stock is not a common product in Hannaford or Whole Foods supermarkets, it could be an untapped market that could offer ample space for other companies to successfully enter.

Conclusion

Since its creation in 2020, the Fishermen Feeding Mainers program has purchased around \$1.2 million of locally caught Maine fish, and turned that fish into around 800,000 donated meals. The program has buoyed Maine's commercial fishing fleet during the Covid-19 pandemic by providing them with a new market to sell their catch, and ensured that the growing number of food insecure Mainers can access the fish caught on their shores. As the Covid-19 relief funds FFM relies on are running out, MCFA is looking for other funding opportunities to keep the program running. There are plenty of opportunities available that MCFA could capitalize on in order to create a value-added finfish product sold in retail stores that could diversify the ways in which FFM is supported. Value-added finfish could provide that alternative funding, consequently keeping Maine's commercial fishermen working, Maine's food insecure communities fed, and providing a sustainable funding model for other philanthropic seafood accessibility programs to follow that will continue to ensure seafood's accessibility.

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Addendum 1:

Processor Interview Questions:

- What months does (NOVA/Free Range/True Fin) process the most fish? Is (NOVA/Free Range/True Fin) able to add processing projects during those months?
- What is (NOVA/Free Range/True Fin)'s offloading facilities like? Can (NOVA/Free Range/True Fin) offload straight from the dock or only by truck?
- What processing equipment does (NOVA/Free Range/True Fin) have? Interested in automatic cutters, mincers, etc.
- What is (NOVA/Free Range/True Fin)'s storage capacity in terms of pounds and products (i.e. processed, whole fish, etc.)? How long is (NOVA/Free Range/True Fin) able to hold onto fish before it gets moved?
- What is (NOVA/Free Range/True Fin)'s distribution capacity? Does (NOVA/Free Range/True Fin) distribute straight to retail or does (NOVA/Free Range/True Fin) use other distributors?
- What is (NOVA/Free Range/True Fin)'s minimum quantity of fish (in lbs) needed in order to process for a particular project?
- Is the price of processing project based on weight based or both? What are the average costs then?

Value-Added Production Interview Questions:

- Is Hurricane able to take on new production projects? When are Hurricane's production facilities the busiest?
- What are Hurricane's storage facilities like? Is Hurricane able to store whole fish, fillets, etc.? How long does Hurricane normally store fish before it is cooked into products, and how long can Hurricane hold onto finished products?
- What are the sizes of Hurricane's soup batches and how much fish does Hurricane need per batch? Is Hurricane able to use whole fish?
- Does Hurricane make stock?
- Is Hurricane able to make value-added products that are not soup/chowder? Examples: burgers, hotdogs, ready to eat meals, etc.
 - If Hurricane is not able to, is the company interested in making value-added products that are not soup/chowder?
- What is the average profit margin for Hurricane's fish-based soups/chowders?
- Why did Hurricane decide to work with the Maine Coast Fishermen's Association?